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(54) Baby pacifier

(57) A baby pacifier has a teat comprising a hollow body made from a silicon rubber of a first hardness filled with a silicon rubber of a lower hardness. The preferred hardness for the hollow body is Shore A 40, and for the filling is Shore A 2 to A 4.

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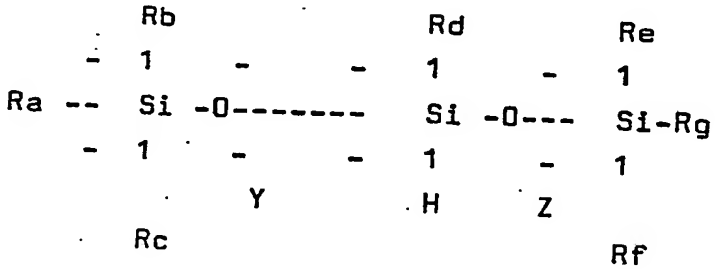


wherein Ra–Rg may be the same or different and are C_1–C_8 alkyl groups.

Preferably R_1 is a vinyl group, R_2–R_5 are methyl group, R_6 is a vinyl or methyl group, Ra–Rg are methyl groups.

X,Y and Z are chosen so that, upon curing, a filling having a Shore A hardness between 1 and 5, especially 2 and 4, is produced. Preferably, Z has a value between 1 and 3.

In the case of both the hollow body of the teat and the filling (for the hollow body), silicone dioxide based fillers may be added to the silicon rubber in order to reinforce the rubber.

Although the teat of the present pacifier may be prepared by any suitable method, in a second aspect of the present invention, there is provided a method for the preparation of a baby pacifier comprising moulding a silicone rubber into a hollow body of a teat, curing the silicone rubber to a first hardness, filling the hollow body with a silicone rubber and curing the silicon rubber to a second, lower hardness.

The hollow body is preferably formed by injection moulding. Similarly, the filling is preferably introduced to the hollow body by injection.

Both curing steps are preferably performed at elevated temperatures, especially between 40 degrees and 100 degrees C. Furthermore, both steps may be initiated by the use of peroxide or catalysed by the use of a platinum catalyst. Inhibitors may be used to regulate and/or terminate the curing steps.

Using the preferred process of this invention, it is found that the filling adheres to the surface of the hollow body through a combination of chemical and mechanical forces. This is especially so when the preferred filling of this invention is employed. The adherence of the filling to the surface of the hollow body, reinforces the advantageous properties (especially of shear strength) exhibited by the present, hollow body/filling combination, teat.

The combination of a hollow body comprising a moderately hard silicone rubber and a filling comprising a relatively soft silicone rubber affords a teat which has the same yieldability as if the hollow body were pneumatically sealed with air at ambient pressure, but which are a much higher shear strength than such a pneumatically sealed teat. The present teat, therefore, offers a greater resistance to being bitten off, when the pacifier is in use than the teats of presently available pacifiers.

Further aspects of the invention will be understood from consideration of the following description in relation to the manufacture and design of a presently preferred embodiment of the invention. In the accompanying drawings:–

Figure 1 is an elevation, partly in section, and

Figure 2 is a plan view of the same.

The pacifier shown in the drawing comprises a generally circular mouth shield 10 presenting a convex face towards the face of the infant, when in use, and provided with the usual safety holes 12. The shield is moulded for example from a polycarbonate or other relatively rigid plastics material to provide an integral generally cylindrical wall 14 upstanding from the concave side of the shield.

The test substitute comprises a somewhat part spherical and 16 projecting from a smaller diameter generally cylindrical portion 18 which is unitary with a bead 20 located inside the cylindrical wall 14.

A fixing plug has, in this particular embodiment, a disc 22 which substantially fills the mouth of the cylindrical wall 14, with an integral generally cylindrical portion 24 which extends into the neck of a tubular portion of the teat and traps and bead in the cylindrical part 14 against any possibility of the teat being separated from the mouth shield. The disc 22 is integral with a knuckle 26 pivoting a finger ring 28. The disc 22 may be fixed in position by an ultrasonic welding operation which unites it with the wall 14 for xample in the vicinity of the area indicated by the reference arrow 30.

The teat comprising the bead 20, the tubular portion 18 and the part spherical end 16 may be made as an injection moulding of a liquid silicon rubber in a pair of matched disc

SPECIFICATION

Baby pacifier

This invention relates to a baby pacifier of the kind comprising a teat substitute, usually projecting to one side of a mouth shield, with a loop or finger ring on the other side of the shield.

For many years, baby pacifiers have been prepared using silicone rubbers. Usually the teat of the pacifier consists of a hollow body prepared from a silicone rubber having a Shore A hardness of between 30 and 60. In such cases, the thickness of the body wall is generally between about 1 and 3mm.

The use of silicone rubbers having a Shore A hardness of between 30 and 60 in baby pacifiers represents a compromise. Pacifiers prepared from silicone rubbers having Shore A hardnesses higher than 60 are extremely hard and therefore resistant to breakage. Unfortunately, such rigid pacifiers have proved unacceptable to babies and young children. On the other hand, pacifiers prepared from silicone rubbers having Shore A hardnesses lower than 30, whilst being acceptable to babies and young children, are mechanically very weak.

Although pacifiers of the type at present in use (i.e. with hollow bodied teats prepared from silicone rubber, Shore A hardness 30 to 60) have proved to be acceptable to babies and young children, they suffer from a major disadvantage. This is that the teat has only a low to moderate shear strength and could therefore be bitten off.

It is an object of the present invention to provide a baby pacifier than overcomes, to a considerable degree, the disadvantage associated with pacifiers of the known type.

Other objects and advantages of the present invention will become apparent from the following detailed description thereof.

According to the present invention, there is provided a baby pacifier having a teat comprising a hollow body, formed from a silicone rubber of a first hardness, the body being filled with a silicone rubber of a second, lower hardness.

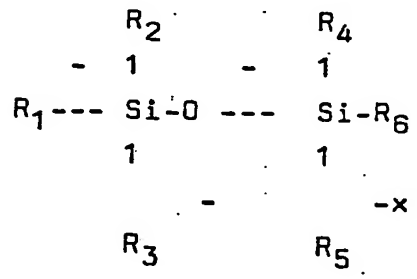
Preferably the hollow body is formed from a silicone rubber having a Shore A hardness between 30 and 60, especially between 35 and 50, most especially about 40. In a particularly preferred embodiment of the present invention the hollow body has a wall thickness between 1 and 3mm, especially about 2mm.

The silicone rubber filling preferably has a Shore A hardness between 1 and 5, especially between 2 and 4. In a preferred embodiment of the present invention the Shore A hardness ratio, between the hollow body silicone rubber and the silicone rubber filling is between 10 to 1 and 30 to 1, especially between 15 to 1 and 25 to 1.

Any non-toxic, silicone rubber that can be moulded into a suitable shape and cured to a suitable Shore A hardness may be used to form the hollow body of the present teat.

Similarly, any non-toxic, silicone rubber that can be introduced, preferably by injection, into the hollow body and cured to a suitable Shore A hardness may be used to form the filling.

However, in a particularly preferred embodiment of the present invention, the filling is a cured combination of (a) an alkenyl (especially vinyl) or dialkenyl (especially divinyl) chain stopped polydialkylsiloxane, e.g. a polymer of the formula



wherein R_1 is a C_1–C_6 alkenyl group,

R_2 to R_5 may be the same or different and are C_1–C_8 alkyl groups, and

R_6 is either a C_1–C_6 alkenyl group or, which is preferred, a C_1–C_8 alkyl group, and

(b) a dialkylsiloxane–alkyl hydrogen siloxane copolymer, e.g. a polymer of the formula

bead. The injected material may be cured, that is vulcanised, in the mould. The desired Shore hardness of this part, mentioned, is 40.

Subsequently, the hollow part may be substantially filled with a further silicon rubber of similar composition, but arranged to have a Shore hardness of about 2 after vulcanisation. This further liquid silicon rubber may be introduced into the hollow part through an injection needle, with care taken to avoid inclusion of air bubbles during the filling operation. A typical curing operation will require some 2 hours at a temperature of 90 degrees C.

After the injection and curing, the teat is effectively of solid rubber throughout, but with a different hardness at the surface than in the interior. The two silicon rubbers will effectively fuse together, so that there will be no voids.

Filling may extend towards the bead area, but including part of the space to be occupied by the plug 24 when assembly takes place. The plug 24, when inserted, forces its way into the relatively soft interior and may compress the same particularly in the region of the bead end of the tubular portion and this may give an additional stiffness to the test locally.

It is to be appreciated that the invention is not limited to the described embodiment in terms of construction, and for example the teat 16 18 20 maybe replaced by one of non-circular shape, particularly a so-called orthodontic teat. Alternative fixing means can be employed to attach the teat to the mouth shield, and the invention also includes the possibility of making the teat, mouth shield and finger ring generally unitary as a single moulding of the higher hardness material with the interior of the teat subsequently filled with the lower hardness material in the same way as described herein.

CLAIMS

1. A baby pacifier having a teat comprising a hollow body formed from a silicon rubber of a first hardness, the body being substantially filled of a silicon rubber of a second and lower hardness.

2. A pacifier as claimed in claim 1 wherein the first hardness is Shore A between 30 and 60.

3. A pacifier as claimed in claim 2 wherein the first hardness is Shore A between 35 and 50.

4. A pacifier as claimed in any proceeding claim wherein the first hardness is Shore A hardness about 40.

5. A pacifier as claimed in any proceeding claim wherein the filling is a Shore A hardness between 1 and 5.

6. A pacifier as claimed in claim 5 wherein the filling has Shore A hardness between 2 and 4.

7. A pacifier as claimed in any proceeding claim wherein the ratio between the Shore A hardness of the hollow body and the filling is between 10–1 and 30–1.

8. A pacifier as claimed in any preceeding claim wherein the ratio between the Shore A hardness of the hollow body and the filling is between 15–1 and 25–1.

9. A pacifier according to any proceeding claim wherein the filled teat is secured to a mouth-shield by means of a fixing plug.

10. A baby pacifier substantially as described with reference to the accompanying drawing.

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Fig. 1

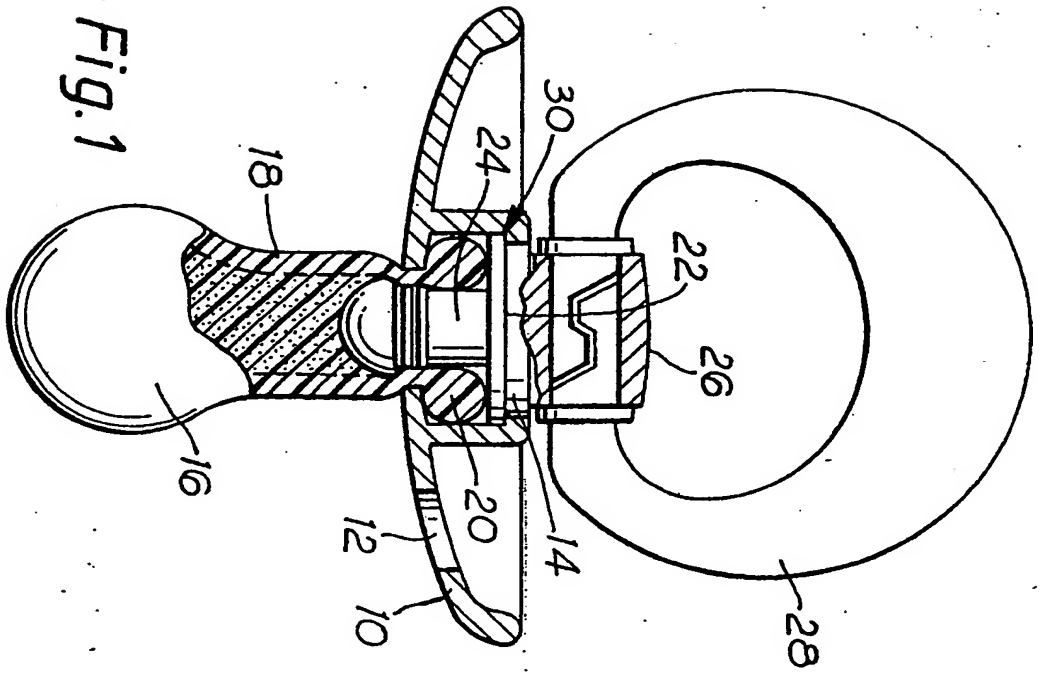

Fig. 2